PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-093952
(43)Date of publication of application : 02.04.2003

(51)Int.CI. B05C 9/14
B05D 3/00
B05D 3/02
F26B 3/30
F26B 3/347
F26B 13/10
F26B 13/18

(21)Application number : 2001-297402
(22)Date of filing : 27.09.2001

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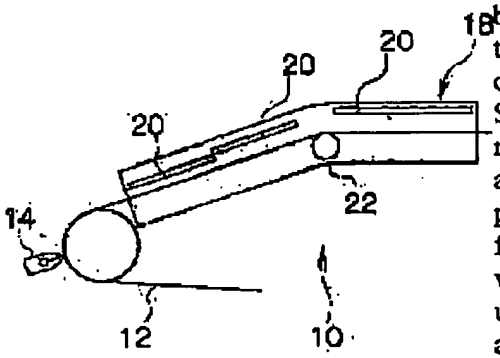
(54) METHOD AND APPARATUS FOR DRYING COATING FILM



(57)Abstract:
PROBLEM TO BE SOLVED: To suppress drying unevenness and to efficiently carry out drying when drying a coating film surface formed by coating a beltlike flexible support which travels continuously with various liquid type compositions.
SOLUTION: A dryer 18 for condensing and recovering a solvent in a coating liquid is arranged at the coating surface side at a traveling position immediately after coating the beltlike flexible support 12 which travels continuously with the various liquid type compositions by using a coating means 16. Condensation plates as a platy member are arranged in the dryer 18 almost in parallel and spaced by prescribed distances from the beltlike flexible support 12. The distances between the condensation plates and the beltlike flexible support 12 are changed in the travelling direction of the beltlike flexible

support 12.

LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

CLAIMS

[Claim(s)]

[Claim 1] In the desiccation approach of the spreading film which applies coating liquid to the band-like flexibility base material it runs with a spreading means, and arranges in the transit location immediately after spreading the dryer which makes the solvents in coating liquid condense and collect The desiccation approach of the spreading film characterized by changing the distance of this condensation plate and a band-like flexibility base material in the transit direction of a band-like flexibility base material while keeping said band-like flexibility base material and predetermined distance from said dryer and arranging in abbreviation parallel the condensation plate which is plate-like part material.

[Claim 2] The desiccation approach of the spreading film according to claim 1 to which the distance of said condensation plate and a band-like flexibility base material is changed stair-like in the transit direction of a band-like flexibility base material.

[Claim 3] The desiccation approach of the spreading film according to claim 1 to which predetermined include-angle dip of said condensation plate is carried out toward the

transit direction of said band-like flexibility base material, and the distance of said condensation plate and a band-like flexibility base material is changed in the shape of a taper in the transit direction of a band-like flexibility base material.
[Claim 4] The desiccation approach of the spreading film according to claim 1, 2, or 3 which arranges a diaphragm among condensation plates or it detaches and arranges condensation plates while arranging two or more condensation plates in said dryer along the transit direction of a band-like flexibility base material.
[Claim 5] The desiccation approach of the spreading film according to claim 1, 2, 3, or 4 which contains an organic solvent more than 3 mass % in said coating liquid.
[Claim 6] The desiccation approach of the spreading film according to claim 1 to 5 that the distance of said spreading means and said dryer is 5m or less.
[Claim 7] The desiccation approach of the spreading film according to claim 1 to 6 that the distance of said spreading means and said dryer is 0.7m or less.
[Claim 8] The travel speed of said band-like flexibility base material is the desiccation approach of the spreading film according to claim 1 to 7 which is the rate to which a band-like flexibility base material reaches said dryer within 30 seconds after spreading by said spreading means.
[Claim 9] The travel speed of said band-like flexibility base material is the desiccation approach of the spreading film according to claim 1 to 8 which is the rate to which a band-like flexibility base material reaches said dryer within 20 seconds after spreading by said spreading means.
[Claim 10] The desiccation approach of the spreading film according to claim 1 to 9 that the thickness of said spreading film is 0.001-0.08mm.
[Claim 11] The desiccation approach of the spreading film according to claim 1 to 10 that the travel speed of said band-like flexibility base material is a part for 1-100m/.
[Claim 12] The desiccation approach of the spreading film according to claim 1 to 12 that the travel speed of said band-like flexibility base material is a part for 5-80m/.
[Claim 13] The desiccation approach of the spreading film according to claim 1 to 12 of having allotted the cooling means to said dryer.
[Claim 14] The desiccation approach of the spreading film according to claim 1 to 13 of having allotted the heating means to the opposite hand of said dryer on both sides of said band-like flexibility base material.
[Claim 15] The desiccation approach of the spreading film according to claim 14 which used the heating roller for said heating means.
[Claim 16] The desiccation approach of the spreading film according to claim 14 which used the infrared heater or the microwave heating means for said heating means.
[Claim 17] The desiccation approach of the spreading film according to claim 1 to 16 that the distance of the front face of said spreading film and the front face of said dryer is 0.01-200mm.
[Claim 18] The desiccation approach of the spreading film according to claim 1 to 17 that the distance of the front face of said spreading film and the front face of said dryer is 0.01-100mm.
[Claim 19] The desiccation approach of the spreading film according to claim 13 to 18 to which the laying temperature of said heating means is changed in the transit direction of a band-like flexibility base material.
[Claim 20] The desiccation approach of the spreading film according to claim 13 to 19 to

which the laying temperature of the cooling means of said dryer is changed in the transit direction of a band-like flexibility base material.
[Claim 21] The desiccation approach of the spreading film according to claim 19 to which the laying temperature of said heating means is changed stair-like.
[Claim 22] The desiccation approach of the spreading film according to claim 19 to which the laying temperature of said heating means is changed without going through stages and gradually.
[Claim 23] The desiccation approach of the spreading film according to claim 20 to which the laying temperature of the cooling means of said dryer is changed stair-like.
[Claim 24] The desiccation approach of the spreading film according to claim 20 to which the laying temperature of the cooling means of said dryer is changed without going through stages and gradually.
[Claim 25] In the dryer of the spreading film which is arranged in the latter part following a spreading means to apply coating liquid to the band-like flexibility base material it runs, and consists of a dryer which makes the solvents in the applied coating liquid condense and collect The dryer of the spreading film characterized by keeping said band-like flexibility base material and predetermined distance from said dryer, arranging in abbreviation parallel the condensation plate which is plate-like part material, and the distance of this condensation plate and a band-like flexibility base material serving as adjustable in the transit direction of a band-like flexibility base material.
[Claim 26] The dryer of the spreading film according to claim 25 from which the heating means is allotted to the opposite hand of said dryer on both sides of said band-like flexibility base material, and the laying temperature of this heating means may have comes to change in the transit direction of a band-like flexibility base material.
[Claim 27] The dryer of the spreading film according to claim 25 or 26 from which the cooling means is allotted to said dryer and the laying temperature of this cooling means may have comes to change in the transit direction of a band-like flexibility base material.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the desiccation approach of the spreading film, and equipment, and relates to the desiccation approach and equipment which dry a double width spreading film surface by the long picture which applied and formed various liquefied constituents in the band-like flexibility base material which carries out continuation transit especially.
[0002] This technique is used for manufacture of the functional film containing fine structure particles, such as optical functionality film sheets, such as an optical compensation sheet, a solvent under coat of the film for sensitive material, heat developing sensitive material, and a nano particle, a photographic film, the photographic paper for photographs, a magnetic-recording tape, adhesive tape, pressure sensitive paper, an offset plate, a cell, etc. .
[0003]
[Description of the Prior Art] About the desiccation approach and equipment which dry a double width spreading film surface by the long picture which applied and formed

various liquefied constituents in the band-like flexibility base material which carries out continuation transit E. B.Gutoff and E.D.Cohen "Coating and Drying Defects" (Wiley-Intersciece, John Wiley & Sons, Inc) of work A non-applying field side is supported with a roll. The desiccation approach which blows a wind and is dried from an air nozzle to a spreading side side, and the air floating desiccation approach of the non-contact type dried without the condition, i.e., a base material, of the spreading side and the non-applying field having blown the wind from the air nozzle, and having surfaced the base material contacting a roll etc. are described. About the desiccation approach of this non-contact type, a tooth space is used efficiently and there is the desiccation approach using the dryer of a bowstring winding pattern which is indicated by JP,48-42903,B as an approach of drying efficiently etc.

[0004] usually, the approach (henceforth the draught drying approach) of puffing these winds and drying **** -- by spraying the wind which carried out gas conditioning on a spreading side, the solvent contained all over a spreading side is evaporated, and is dried. Although excelled in drying efficiency, in order to hit a wind to a spreading side through direct or a perforated plate, a straightening vane, etc., this draught drying approach A spreading side is in disorder with this wind, and the thickness of a spreading layer serves as an ununiformity. Produce nonuniformity or the convection current -- the vapor rate of the solvent in a spreading side -- an ununiformity -- becoming -- the so-called yuzu citron skin (Yuji Ozaki work, "coating engineering", pp 293-294, Asakura Publishing, 1971, reference) etc. -- it generated and there was a problem that a uniform spreading layer was not obtained.

[0005] When an organic solvent is especially included in coating liquid, generating of such nonuniformity is remarkable. In early stages of desiccation, this reason is in the condition that the organic solvent was fully contained in the spreading film, if evaporation distribution of an organic solvent arises in this phase consequently, will produce temperature distribution and surface tension distribution in a spreading film surface, and will depend them on the so-called floating of the MARANGONI convection current etc. occurring within a spreading film surface. Generating of such nonuniformity serves as a serious spreading defect.

[0006] When liquid crystal was included in the spreading film, there were not only the above-mentioned desiccation nonuniformity but problems, like gap arises in the orientation of the liquid crystal of a spreading film surface by the wind to spray.

[0007] As an approach of solving these troubles, it is JP,2001-170547,A. The configuration which forms a desiccation dryer immediately after spreading is shown. Here, a desiccation dryer is divided and the method of suppressing generating of nonuniformity into the divided part by [of the cross direction of a base material] making it ventilate and dry, controlling a wind speed from one end to another side one end on the other hand is indicated. JP,9-73016,A **** -- the method of installing a wire gauze is indicated instead of dividing a desiccation dryer for the same object.

[0008] moreover, JP,2001-170547,A **** -- the approach of making increase the viscosity of coating liquid and controlling by this floating of the spreading film surface immediately after spreading depended in the style of desiccation and the method of preventing generating of nonuniformity according to the leveling effectiveness, even if floating of the paint film side immediately after spreading depended in the style of desiccation occurs by using a high-boiling point solution are indicated by high-

concentration-izing coating liquid or adding a thickener to coating liquid.
[0009] However, JP,2001-170547,A JP,9-73016,A Although there is effectiveness in inflow suppression of the uneven wind from the outside of a desiccation dryer, if it is going to control a wind speed by the approach not to disturb a spreading film surface, it is necessary to lower a wind speed greatly. Consequently, it is necessary to lengthen the die length of a desiccation dryer so that a rate of drying may fall substantially and may cope with it. Therefore, spreading effectiveness worsens. Moreover, it is difficult to still lose the effect of a wind thoroughly.
[0010] Moreover, the approach of making thicken coating liquid or using a high-boiling point solution is JP,2001-170547,A. High-speed spreading fitness was abolished, or buildup of the drying time was brought about, and there was a problem that productive efficiency got extremely bad as stated.
[0011] thus, the approach of drying by the draught drying approach in case an organic solvent is included in the draught drying approach, especially coating liquid, without spraying a wind in order to cause the ununiformity of desiccation of a spreading side in the early stages of desiccation -- GB1401041, US5168639, and US5694701 etc. -- it is indicated.
[0012] namely, GB1401041 **** -- the method of evaporating the solvent in coating liquid, and collecting and drying it is indicated without blowing a wind. This approach is the approach of establishing the entry of a base material, and an outlet in the casing upper part, and heating a non-applying field within casing, promoting evaporation of the solvent from a spreading side, making condense a solvent by the approach of making it dew the condensation plate installed in the spreading side side, collecting solvents, and drying the spreading film.
[0013] moreover, US5168639 **** -- the method of collecting solvents in the upper part of the base material it runs horizontally using a drum is indicated. Furthermore, US5694701 It is US5168639. The proposal about the amelioration approach of a layout is made.
[0014]
[Problem(s) to be Solved by the Invention] however, GB1401041 **** -- since the entry of a base material and the outlet are limited to the casing upper part, in the layout of equipment, constraint is large and it is difficult to include in the existing spreading process. Moreover, Fig.5 Since it is necessary to reverse the base before going into that the distance more than fixed is the need by the time it goes into the recovery dryer after spreading, or a recovery dryer in the example shown, it is difficult to stop the nonuniformity immediately after spreading efficiently.
[0015] US5168639 Since the distance from a spreading side to condensation and a solvent recovery drum changes in the spreading direction then and covering all the fields in casing and controlling a rate of drying to homogeneity separates difficultly superfluously [the distance of a spreading side and condensation / cooling drum] a casing inlet port and near an outlet, another spreading nonuniformity will be produced according to generating of a free convection.
[0016] US5168639 It was difficult to take the configuration which the distance from a coater to condensation and solvent recovery equipment is made to approach, and it was inadequate for the cure against spreading nonuniformity. [of the amelioration approach of a layout]

[0017] Morcover, installation locations, such as a condenser in condensation and a recovery system and heating apparatus, laying temperature, etc. tend to be set constant, and it is going to make homogeneity evaporate and collect within equipment in the condensation / recovery approach of the above-mentioned conventional solvent. Therefore, although it is convenient to set it as the same rate of drying over the whole region within equipment, the optimal conditions can be chosen and it cannot be made to dry in each phase of an anaphase the early stages of desiccation, and the middle. That is, control of the optimum conditions for spreading nonuniformity control, the control made into fine desiccation membraneous quality were difficult, and it was difficult to cover the whole process and to increase the efficiency of desiccation.

[0018] For example, although it is necessary to make small distance of the condensation plane of equipment, and the spreading film in order to enlarge a rate of drying, it is easy to be influenced of the set-up range accuracy. Moreover, when raising range accuracy, generally, the manufacturing cost of equipment becomes high by leaps and bounds, and is not desirable.

[0019] Moreover, when homogeneity wants to have dried early only the early stages of desiccation, in order to make small distance of the condensation plane of equipment, and the spreading film covering condensation / recovery zone overall length, the dimensional accuracy in the whole equipment needed to be raised by the conventional approach, and it had become lifting of considerable cost by it.

[0020] On the other hand, to stop low the rate of drying in early stages of desiccation, it is necessary to lower the drying efficiency of the whole condensation / recovery zone. In this case, there was a problem that condensation / recovery zone overall length had to be lengthened.

[0021] This invention is made in view of such a situation, controls the desiccation nonuniformity generated immediately after spreading in a double width spreading film surface in the long picture which applied and formed various liquefied constituents in the band-like flexibility base material which carries out continuation transit, and aims at offering the desiccation approach of the spreading film and equipment which are dried efficiently.

[0022]

[Means for Solving the Problem] In the desiccation approach of the spreading film which applies coating liquid to the band-like flexibility base material it runs with a spreading means, and arranges in the transit location immediately after spreading the dryer which makes the solvents in coating liquid condense and collect in order that this invention may attain said object While keeping said band-like flexibility base material and predetermined distance from said dryer and arranging in abbreviation parallel the condensation plate which is plate-like part material, it is characterized by changing the distance of this condensation plate and a band-like flexibility base material in the transit direction of a band-like flexibility base material.

[0023] In the approach of drying a spreading film surface [double width in the long picture which applied and formed various liquefied constituents in the band-like flexibility base material which carries out continuation transit according to this invention] While the dryer which condenses and collects the solvents of coating liquid is arranged immediately after a spreading means, and keeping [from / band-like flexibility] predetermined distance from the dryer and arranging in abbreviation parallel the

condensation plate which is plate-like part material The desiccation nonuniformity which is easy to generate immediately after spreading can be controlled, and it can be made to dry efficiently by changing the distance of a condensation plate and a band-like flexibility base material in the transit direction of a band-like flexibility base material.
[0024] Effectiveness is large, when the organic solvent is especially contained in coating liquid, or when all the solvents of coating liquid consist of organic solvents.
[0025] Moreover, this invention is characterized by containing an organic solvent more than 3 mass % in said coating liquid. Also in this case, the desiccation nonuniformity generated immediately after spreading can be controlled, and it can be made to dry efficiently by applying this invention.
[0026] In addition, an organic solvent means an organic compound with the property to dissolve the matter. Aromatic hydrocarbon, such as toluene, a xylene, and styrene, chlorobenzene, Methane derivatives, such as chlorination aromatic hydrocarbon, such as ORUTO dichlorobenzene, and a mono-methyl chloride, The chlorination aliphatic hydrocarbon containing ethane derivatives, such as mono-chloroethane, etc. Alcohols, such as a methanol, isopropyl alcohol, and isobutyl alcohol, Ether, such as ester, such as methyl acetate and ethyl acetate, ethyl ether, and 1,4-dioxane, The mixture of aliphatic hydrocarbon, such as alicyclic hydrocarbon, such as glycol ether, such as ketones, such as an acetone and a methyl ethyl ketone, and ethylene glycol monomethyl ether, and a cyclohexane, and normal hexane, aliphatic series, or aromatic hydrocarbon etc. corresponds.
[0027]
[Embodiment of the Invention] Hereafter, it explains in full detail about the desiccation approach of the spreading film applied to this invention according to an accompanying drawing, and the gestalt of desirable operation of equipment.
[0028] Drawing 1 -8 are the conceptual diagram showing each example of spreading / desiccation line 10 incorporating the dryer with which the desiccation approach of the spreading film of this invention and equipment are applied, respectively.
[0029] So that it may be illustrated spreading / desiccation line 10 The send equipment which mainly sends out the band-like flexibility base material 12 wound in the shape of a roll (graphic display abbreviation), The solvent in the coating liquid of the spreading film by which spreading formation was carried out is condensed to a spreading means 16 to apply coating liquid to the band-like flexibility base material 12, and the band-like flexibility base material 12. It is formed by the dryer which consists of a dryer 18 made to collect and the take-up motion (graphic display abbreviation) which rolls round the product manufactured by spreading and desiccation, and the guide idler 22 of a large number which form the conveyance path the band-like flexibility base material 12 runs and 22 --.
[0030] As a band-like flexibility base material 12, resin films, such as polyethylene, and PET (polyethylene terephthalate), TAC (triacetate), paper, a metallic foil, etc. can be used.
[0031] The thing of various methods can be used for the spreading means 16. For example, slot die coater (refer to drawing 1 , drawing 5 , and drawing 7), wire bar coater (refer to drawing 2 , drawing 4 , and drawing 8), a roll coater, gravure coater (refer to drawing 6), a slide hopper spreading method (refer to drawing 3), a curtain spreading method, etc. can be used.

[0032] In addition, the spreading means 16 may be the configuration that a spreading side receives horizontally and turns up, as shown in drawing 1 , drawing 3 , drawing 5 R> 5, and drawing 7 , and it may be the configuration which receives horizontally and turns down as shown in drawing 2 , drawing 4 , drawing 6 R> 6, and drawing 8 . Moreover, you may be the configuration which receives horizontally and inclines.
[0033] The dust-removing facility 70 may be installed in the preceding paragraph of the spreading means 16, or pretreatment etc. may be performed to the front face of the band-like flexibility base material 12 as shown in drawing 9 . With the optical-character film asked for the high quality of dust etc. which is not almost, quality spreading and the desiccation film can be obtained by adopting these simultaneously.
[0034] A dryer 18 consists of a condensation plate 20 which is the plate-like part material which keeps predetermined distance from from [band-like flexibility / 12], and is prepared in abbreviation parallel, a side-face plate caudad installed from the condensation plate 20 order side. Thereby, when the solvent in the coating liquid of the spreading film volatilizes, the solvent which volatilized has the composition of condensing to the condensation plate 20 and being collected.
[0035] It is desirable to perform coating to a front face, using the ingredient with which the construction material used for the field which makes the solvent of the condensation plate 20 condense is tolerant to the organic solvent when [, such as a metal, plastics, and timber,] an organic solvent is contained in coating liquid, although especially definition is not carried out.
[0036] A means to make the solvents condensed to the condensation plate 30 collect establishes a slot in the condensation plane of the condensation plate 30, and makes solvents collect in a dryer 18 using capillary force. The direction of a slot may be the transit direction of the band-like flexibility base material 12, and may be a direction which intersects perpendicularly with this. What is necessary is just to prepare a slot in the direction which is easy to make solvents collect, when the condensation plate 30 inclines.
[0037] In the example shown in drawing 10, ** 30a for collecting the solvents condensed down the condensation plate 30 right end is prepared, and solvents are collected through ** 30a.
[0038] The configuration which uses the configuration which does the same function so in addition to the configuration which adopts as a dryer 18 the condensation plate 20 which is plate-like part material, for example, a perforated plate, a network, a drainboard, a roll, etc. is also employable. Moreover, US5694701 You may use together with a recovery system as shown.
[0039] From a dryer 18, keep [from / 12 / band-like flexibility] predetermined distance, and the condensation plate 20 which is plate-like part material is arranged in abbreviation parallel. As a configuration changed in the transit direction of a band-like flexibility base material, the distance of the condensation plate 20 and the band-like flexibility base material 12 which have the composition that the distance of the condensation plate 20 and the band-like flexibility base material 12 can be changed in the transit direction of a band-like flexibility base material As shown in drawing 1 and drawing 2 , while arranging two or more condensation plates 20, 20, and 20 Even if it is the configuration of changing the distance of the condensation plate 20 and the band-like flexibility base material 12 stair-like You may be the configuration (graphic display abbreviation) of

carrying out predetermined include-angle dip of the condensation plate 20 toward the transit direction of the band-like flexibility base material 12, and changing the distance of the condensation plate 20 and the band-like flexibility base material 12 in the shape of a taper in the transit direction of the band-like flexibility base material 12. In this case, the include angle which makes the condensation plate 20 incline toward the transit direction of the band-like flexibility base material 12 receives horizontally, its 30 or less degrees are desirable, and its 20 or less degrees are more desirable.

[0040] Moreover, while arranging two or more condensation plates 20, 20, and 20 in a dryer 18 along the transit direction of the band-like flexibility support 12 in order to do so the same effectiveness as the above The configuration which detaches and arranges the condensation plate 20 and 20 comrades, or as shown in drawing 7 , to condensation 20, the configuration which arranges diaphragms 28, 28, and 28 among 20 comrades, and a pan The condensation plates 20, 20, and 20 are formed in two or more box-like dryers 18, 18, and 18, respectively, and all of a configuration of detaching and allotting the configuration in which the box-like dryer 18 and 18 comrades are stuck or a dryer 18, and 18 comrades can be taken.

[0041] A dryer 18 and the condensation plate 20 do not necessarily need to have the shape of a straight line as shown in drawing 1 , drawing 2 , etc., for example, may be radii-like a dryer 18 and the condensation plate 20 as shown in drawing 5 and drawing 7 . Moreover, a big drum may be prepared and its condensation plate may be arranged.

[0042] In addition, in the example shown in drawing 5 and drawing 7, radii-like a dryer 18 and the condensation plate 20 are brought close to the spreading means 16, and improvement in the recovery effectiveness of a solvent is in drawing.

[0043] In order that a dryer 18 may prevent the desiccation nonuniformity of the spreading film by generating of the free convection immediately after applying coating liquid, the thing of the spreading means 16 arranged as much as possible in near is desirable. It is desirable to specifically arrange so that the inlet port of a dryer 18 may become the location of less than 5m from the spreading means 16, it is more desirable to arrange so that the inlet port of a dryer 18 may become the location of less than 2m from the spreading means 16, and it is most desirable to arrange so that the inlet port of a dryer 18 may become the location of less than 0.7m from the spreading means 16.

[0044] As for the travel speed of the band-like flexibility base material 12, it is desirable that it is the rate to which the band-like flexibility base material 12 reaches a dryer 18 within 30 seconds after spreading by the spreading means 16 at the same reason, and it is more desirable that it is the rate to which the band-like flexibility base material 12 reaches a dryer 18 within 20 seconds after spreading by the spreading means 16.

[0045] It is easy to generate nonuniformity from floating inside the spreading film tending to occur so that the coverage and spreading film thickness of coating liquid are large, but according to this invention, sufficient effectiveness is acquired even when coverage and spreading film thickness are large. If the thickness of the spreading film is 0.001-0.08mm, it can dry efficiently [there is no nonuniformity and].

[0046] If the travel speed of the band-like flexibility base material 12 is too large, therefore, the boundary layer near the spreading film will be disturbed in the style of company, and it will have an adverse effect on the spreading film. Therefore, for the travel speed of the band-like flexibility base material 12, it is good **** more it to be desirable to set it as a part for 1-100m/, and to set it as a part for 5-80m/.

[0047] In order to promote evaporation of the solvent in coating liquid, and condensation, it is desirable to heat the band-like flexibility base material 12 and/or the spreading film, to cool the condensation plate 20, or to adopt the both-hands stage. For example, a cooling means (graphic display abbreviation) is allotted to a dryer, and the heating means 24 and 24 are allotted to the opposite hand of a dryer 18 on both sides of the band-like flexibility base material 12 (refer to drawing 4 , drawing 6 , and drawing 8).
[0048] In order to control the rate of drying of the spreading film in any case, it is desirable to carry out temperature management. The condensation plate 20 can be made to carry out a temperature control, and it is necessary to install the facility for cooling to cool. The air cooling using the thing of the heat-exchanger method of the water cooling type using a refrigerant etc. and a wind and the method using the electrical and electric equipment, for example, the method which used the Peltier device, can be used for cooling.
[0049] A heater can be arranged and heated to an anti-spreading film side to heat the band-like flexibility base material 12, the spreading film, or its both. Moreover, the conveyance roll (heating roller) in which temperature up is possible can also be arranged and heated. In addition, you may heat using an infrared heater, a microwave heating means, etc.
[0050] In case the temperature of the band-like flexibility base material 12, the spreading film, and the condensation plate 20 is determined, it must be careful that it must be made for the evaporated solvent not to have to dew locations other than condensation plate 20, for example, the front face of a conveyance roll etc. For this reason, for example, dew condensation of this kind is avoidable by making temperature of parts other than condensation plate 20 higher than the temperature of the condensation plate 20.
[0051] After taking into consideration the rate of drying of the desired spreading film, it is necessary to adjust the distance (spacing) of the front face of the spreading film, and condensation plate 20 front face of a dryer 18 to a suitable distance. If distance is shortened, while a rate of drying will increase, it is easy to be influenced of the set-up range accuracy. On the other hand, if distance is enlarged, a rate of drying not only falls substantially, but the free convection by heat will occur and it will cause desiccation nonuniformity. The distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 has 0.1-200 desirablemm, and is more desirable. [of 0.5-100mm]
[0052] Moreover, the configuration changed in the transit direction of the band-like flexibility base material 12 can also take the laying temperature of the heating means 24 and 24. For example, in drawing 4 , drawing 6 , etc., laying temperature of the heating means 24 of the upstream is made lower than the laying temperature of the heating means 24 of the downstream in the transit direction of the band-like flexibility base material 12. Thus, by setting up, desiccation nonuniformity can also be controlled further.
[0053] Similarly, the configuration changed in the transit direction of a band-like flexibility base material can also take the laying temperature of the cooling means of a dryer 18. In drawing 4 , drawing 6 , etc., the laying temperature of the cooling means of the dryer 18 of the upstream is changed with the laying temperature of the cooling means of the downstream in the transit direction of the band-like flexibility base material 12. In addition, with the configuration of drawing 4 and drawing 6 , while arranging two or more condensation plates 20, 20, and 20, it is combined with the configuration to which

the distance of the condensation plate 20 and the band-like flexibility base material 12 is changed stair-like.

[0054] In addition, various kinds of modes, such as a configuration to which the laying temperature of the heating means 24 and 24 is changed stair-like, a configuration to which the laying temperature of the cooling means of a dryer 18 is changed stair-like, or a configuration which combined these, can take.

[0055] In addition, the member of common use is used for the send equipment currently used for spreading / desiccation line 10 incorporating the dryer with which the desiccation approach of the spreading film of this invention and equipment are applied, a guide idler 22, and a take-up motion, and those explanation is omitted.

[0056] According to the dryer of the spreading film of this invention explained in full detail above, the nonuniformity generated on the spreading film immediately after spreading is controlled, and the spreading film can be efficiently dried to homogeneity. Moreover, without changing the layout of spreading and a desiccation process greatly, since it is restrained by neither the physical properties of coating liquid, nor the class of solvent, the flexible design of a coating liquid formula means is still more possible.

[0057] That is, it can do with the same gestalt as the equipment of this invention only by extending the dryer which condenses and collects solvents between the spreading sections of spreading and a dryer and draught drying equipment which contain existing draught drying equipment, for example, consequently equipment modification can be performed in low cost.

[0058] Moreover, according to the dryer of the spreading film of this invention, there is effectiveness also in energy saving and a cost cut. Namely, inside of the evaporation gas generated with spreading / desiccation line Since no solvents other than water can be emitted to atmospheric air as they are, they need to liquefy and collect evaporation gases and need the solvent gas recovery facility for it. However, with spreading / desiccation line 10, since the direct recovery of the solvent can be carried out in the state of a liquid with the dryer which condenses and collects some coating liquid, the load of a solvent gas recovery facility can be reduced.

[0059] When the dryer of the spreading film of this invention is used together with draught drying equipment, the air blasting facilities for blowing a wind can be reduced substantially. Therefore, costs, such as an air conditioning installation cost, can also be reduced substantially, and a facility is dramatically possible for a compact.

[0060] Moreover, when the dryer of the spreading film of this invention was used, since very uniform desiccation was possible, in the early stages of desiccation, it turned out that the following effectiveness which was not expected is acquired. That is, with conventional draught drying equipment, since the effect which disturbs the spreading film was not able to be suppressed thoroughly, floating had been produced in the spreading film, but when the equipment of this invention was used, it turned out that the structure of the network of the macromolecule in the spreading film which can prevent those floating and is formed during desiccation, and a particle can be formed in homogeneity dramatically finely.

[0061] When the structure of the spreading film becomes fine by this only in making homogeneity only dry the spreading film, in the case of for example, an optical film, it leads to the ability of a new option to also be added.

[0062] Moreover, it can be said that the dryer of the spreading film of this invention fits

dramatically desiccation of the functional film with which for example, a nano particle etc. is contained etc.
[0063] The same effectiveness is acquired even when the dryer of the spreading film of this invention is applied to that by which solid content, such as a macromolecule and a particle, was dissolved or distributed by coating liquid. Rather, by the system in which a particle etc. is contained, generating of desiccation nonuniformity also influences distributed distribution of the particle in the spreading film greatly. Therefore, it is desirable to use this system for this system.
[0064]
[Example] The structure of a suitable dryer when arranging the dryer 18 which makes the solvents in coating liquid condense and collect in the desiccation process of the spreading layer in the production line of the optical compensation sheet shown in [example 1] drawing 9 and manufacturing an optical compensation sheet at it and condensation of a solvent, and recovery conditions were examined.
[0065] As shown in drawing 9 , the production line of an optical compensation sheet is performed by the following process.
1) Sending-out process 50 of a bright film 12;
2) Formation process 52 of the resin layer for orientation film formation which applies and dries the coating liquid which contains the resin for orientation film formation on the surface of a bright film;
3) Rubbing process 54 which performs rubbing processing to the front face of a resin layer, and forms the orientation film on a bright film on the bright film with which **** for orientation film formation was formed in the front face;
4) Spreading process 16 of the liquid crystallinity discotheque compound which applies the coating liquid containing a liquid crystallinity discotheque compound on the orientation film;
5) Desiccation process 18 which this spreading film is dried [process] and evaporates the solvent in this spreading film;
6) Liquid crystal layer formation process 58 which heats this spreading film to discotheque pneumatic phase formation temperature, and forms the liquid crystal layer of a discotheque pneumatic phase;
7) Process 60 which solidifies this liquid crystal layer (that is, when the liquid crystallinity discotheque compound which quenches after the liquid crystal stratification, and is solidified, or has a cross-linking functional group is used, a liquid crystal layer is made to construct a bridge by optical exposure (or heating));
8) The rolling-up process 24 which rolls round the bright film with which this orientation film and a liquid crystal layer were formed.
[0066] in addition, drawing 9 -- setting -- 62 -- a desiccation zone -- 64 -- test equipment -- in 66, 68 shows a lamination machine and 70 shows a **** facility for a protection film, respectively.
[0067] The manufacture approach of an optical compensation sheet was consistent to the process which rolls round the obtained optical compensation sheet from the process which sends out a long picture-like bright film as shown in drawing 3 , and was performed continuously. After applying the 5 % of the weight (MP-203, Kuraray Co., Ltd. make) solution of long-chain alkyl conversion povals and making it dry for 4 minutes at 90 degrees C, rubbing processing was performed and the resin layer for

orientation film formation of 2.0 micrometers of thickness was formed in one film side of the shape of a long picture of triacetyl cellulose (FUJITAKKU, the Fuji Photo Film make, thickness:100micrometer, width of face: 500mm). The bearer rate of a film was a part for 20m/.

[0068] The above-mentioned triacetyl cellulose films were x(nx-ny) d=16nm and {(nx-ny) /2-nz} xd=75nm, when nz and thickness of a film were set [the refractive index of two directions where it intersects perpendicularly in a film plane] to d for the refractive index of nx, ny, and the thickness direction. Moreover, formation of the above-mentioned resin layer for orientation film formation was performed using spreading and a dryer.

[0069] Then, rubbing processing was performed to the resin layer front face, conveying the film which has the obtained resin layer by part for 20m/continuously. Rubbing processing performed the rotational frequency of a rubbing roller in 300rpm, and dust removing of the orientation film subsequently obtained was performed.

[0070] Subsequently, conveying the film which has the obtained orientation film the rate for 20m/continuously On the orientation film, by the weight ratio of (5) of (3) of discotheque compound TE-8, and TE-8, into the mixture of 4:1 The 10-% of the weight methyl-ethyl-kctone solution (coating liquid) of the mixture which added the photopolymerization initiator (the IRUGA cure 907, Ciba-Geigy Japan make) 1% of the weight to the above-mentioned mixture The spreading rate was applied with the wire bar spreading machine, 20m a part for /and coverage were applied by 5 cc/m2, and, subsequently desiccation and a heating zone were passed. Delivery and a heating zone adjusted the wind to 130 degrees C in the desiccation zone. It went into the desiccation zone after [of an after / spreading] 3 seconds, and went into the heating zone after 3 seconds. It passed through the heating zone in about 3 minutes.

[0071] Then, ultraviolet rays were irradiated with the ultraviolet ray lamp on the front face of a liquid crystal layer, this orientation film and a liquid crystal layer having been applied, and conveying a film by part for 20m/continuously. That is, the film which passed through the above-mentioned heating zone irradiated ultraviolet rays with an illuminance of 600mW for 4 seconds, and made the liquid crystal layer construct a bridge with a black light (ultraviolet ray lamp: the output of 160W/cm, 1.6m of luminescence length).

[0072] According to the above-mentioned process, it examined on six kinds of conditions. Below, the condition and a result are described.

[0073] (Trial 1) Whenever [85 degrees-C and condensation board temperature] was made into 25 degrees C for heater temperature. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 3mm.

[0074] Consequently, the mileage of 6m was taken to dry the spreading film thoroughly. The problem was not produced in spreading film quality.

[0075] (Trial 2) Whenever [85 degrees-C and condensation board temperature] was made into 25 degrees C for heater temperature. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 0.5mm.

[0076] Consequently, the mileage of 1m was taken to dry the spreading film. On the

spreading film, desiccation nonuniformity was produced crosswise, and poor orientation was generated.

[0077] (Trial 3) Whenever [85 degrees-C and condensation board temperature] was made into 25 degrees C for heater temperature. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. The condensation plate 20 was divided into three zones. Moreover, three condensation plates 20 were arranged with whenever [tilt-angle / of 5 times / to which the downstream of the transit direction separates each from the spreading film]. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 3mm, 1.5mm, and 0.5mm toward the downstream of the transit direction of three condensation plates 20, respectively.

[0078] Consequently, the mileage of 1.8m was taken to dry the spreading film thoroughly. The problem was not produced in spreading film quality. That is, on this condition, compaction of process die length and coexistence of good spreading film quality were possible.

[0079] (Trial 4) Whenever [60 degrees-C and condensation board temperature] was made into 25 degrees C for heater temperature. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 1mm.

[0080] Consequently, the mileage of 5m was taken to dry the spreading film thoroughly. The problem was not produced in spreading film quality.

[0081] (Trial 5) Whenever [60 degrees-C and condensation board temperature] was made into 15 degrees C for heater temperature. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 1mm.

[0082] Consequently, the mileage of 2m was taken to dry the spreading film thoroughly. On the spreading film, desiccation nonuniformity was produced crosswise, and poor orientation was generated.

[0083] (Trial 6) Heater temperature was made into 60 degrees C. The dryer 18 was arranged so that an inlet port might serve as a location of 500mm from the spreading means 16. The condensation plate 20 was divided into three zones. Moreover, whenever [three condensation board temperature / of the condensation plate 20] was made into 25 degrees C, 20 degrees C, and 15 degrees C toward the downstream of the transit direction, respectively. Distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 was set to 1mm.

[0084] Consequently, the mileage of 0.8m was taken to dry the spreading film thoroughly. The problem was not produced in spreading film quality. That is, on this condition, compaction of process die length and coexistence of good spreading film quality were possible.

[0085] In the desiccation process after under coat spreading in the production line of the cellulose cellulose acetate film for [example 2] sensitization, the case where the dryer which makes the solvents in the coating liquid in this invention condense and collect was arranged was compared with the case where an oven conventional draught drying type is arranged.

[0086] In the production line which used the dryer in this invention shown in drawing 10, a cellulose acetate dope is cast on a flow casting drum side from a flow casting die, the film formed of it strips off and it is stripped off with a roller, and while running between the rolls of a predrying process, hot blast dries.
[0087] Subsequently, the under coat for photosensitive material is performed and it is made to dry with a dryer 18 further. When a residual solvent becomes about 10% or less, lead to width-of-face regulation equipment (graphic display abbreviation), and it is made to extend 2 to 6% crosswise, and it is rolled round after cooling further with turgescence.
[0088] The condensation plate 20 of a dryer 18 was divided into two zones. Moreover, two condensation plates 20 were arranged with whenever [tilt-angle / to which the downstream of the transit direction separates each from the spreading film]. Toward the downstream of the transit direction, it was set as 0.8mm by the entrance side of the condensation plate 20 of the upstream, and the distance of the front face of the spreading film and condensation plate 20 front face of a dryer 18 set it to 2mm by the outlet side, and it was set as 0.8mm by the entrance side of the condensation plate 20 of the downstream, and it was set to 2mm by the outlet side.
[0089] Moreover, the die length of 2m and the condensation plate 20 of the downstream was set to 4m for the die length of the condensation plate 20 of the upstream. Each laying temperature of the condensation plate 20 was made into 15 degrees C.
[0090] the front face of a product which manufactured -- description was good.
[0091] In the production line which used the oven of the conventional draught drying type shown in drawing 11 , the equipment of an under coat spreading desiccation process is an oven usual draught drying type. The part of others of a production line is the same as that of the configuration shown in drawing 10 , and omits explanation.
[0092] the front face of a product which manufactured -- description produced the desiccation nonuniformity in an under coat, and became a defect.
[0093] The example at the time of arranging the desiccation means which combined with the desiccation process of the production line of [example 3] heat developing sensitive material the dryer (preceding paragraph side) condensed and collected and the draught drying means (latter-part side), and the example of a comparison at the time of arranging only the desiccation means draught drying type [conventional] were contrasted.
[0094] The coating liquid for heat developing sensitive material applied to a band-like flexibility base material was prepared as follows.
[0095] 1) After dissolving FUTARU-ized gelatin 22g and 30mg of potassium bromides in the preparation water 700m l. of a silver halide particle and adjusting PH to 5 at the temperature of 35 degrees C, keeping the water solution which contains the water-solution 159m l. and the potassium bromide containing 18.6g of silver nitrates, and a potassium iodide by the mole ratio of 92:8 at pAg7.7, with the control double jet process, it applied for 10 minutes and added. Subsequently, maintaining at the water solution pAg7.7 which contains l., 10.5micro a mol /, and a potassium bromide by l. in one mol /, with the control double jet process, it applied for 30 minutes and the water-solution 476m l. and 6 iridium-chloride **** 2 potassium containing 55.4g of silver nitrates were added. Then, flocking settling of the PH was lowered and carried out, demineralization processing was carried out, phenoxyethanol 0.11g was added, it adjusted to PH 5.9 and pAg8.2, and the iodine-silver-bromide particle (cube particle of iodine content core 8 mol % and an average of two-mol % and average size 0.05micrometer, 8% of projected-area

coefficient of variation, and 90% of field (100) ratios) was prepared.
[0096] In this way, temperature up of the obtained silver halide particle is carried out to 60 degrees C, and it is 85micro mol of sodium thiosulfates per one mol of silver, and 2, 3, 4, 5 and 6. After adding the tellurium compound of 11micro mol and 15micro mol, 3.6micro mol of chloroauric acid, and 280micro mol of thiocyanic acid and riping pentafluorophenyl diphenyl phosphoretted hydrogen selenide for 120 minutes, it quenched at 30 degrees C and the silver halide emulsion was obtained.
[0097] 2) After adding 1 N sodium-hydroxide water-solution 31.1m l. over 15 minutes, having mixed for 40 minutes and stirring violently 1.3g of preparation stearin acid of an organic-acid silver emulsion, 0.5g of arachidic acid, 8.5g of behenic acid, and distilled water 300m l. at 90 degrees C, temperature up was carried out to 30 degrees C. Next, after having added 1 N phosphoric-acid water-solution 7m l., and adding 0.012g of N-bromosuccinimide, stirring more violently, the silver halide particle prepared beforehand was added so that the amount of silver halides might become 2.5m mol. Furthermore, it adding over 25 minutes and stirring 1 N silver-nitrate water-solution 25m l. was continued for 90 minutes as it was. Then, solid content was carried out the ** exception by attraction filtration, and solid content was washed in cold water until the conductivity of filtered water became 30microS-cm. In this way, added and stirred 37g of 1.2% of the weight of butyl-acetate solutions of polyvinyl acetate to the obtained solid content, stopped and left stirring, it was made to separate into an oil reservoir and a water layer, the water layer was removed with the salt contained, and the oil reservoir was obtained. Next, 20g of 2.5-% of the weight 2-butanone solutions of a polyvinyl butyral was added to this oil reservoir, and it stirred to it. furthermore, a fault -- bromination -- after adding pyridinium 0.1m mol and calcium bromide dihydrate 0.18m mol with 0.7g methanol, 2-butanone 40g and 7.8g of polyvinyl CHIRARU were added, it distributed by the homogenizer, and the organic-acid silver salt emulsion (needlelike particle of the average minor axis of 0.04 micrometers, the average major axis of 1 micrometer, and 30% of coefficient of variation) was obtained.
[0098] 3) Each chemical was added so that it might become the following amounts to the organic-acid silver salt obtained by the preparation above of emulsion layer coating liquid per one mol of silver. It added stirring coloring matter [of 1 or 30mg of coloring matter (phenylthio sulfonic-acid sodium 10mg and 68mg)] 2, and 2-mercapto-5-methyl benzimidazole 2g, 21.5g of 4-chlorobenzo phenon-2-carboxylic acids, and 2-butanone 580g and dimethylformamide 220g at 25 degrees C, and was left for 3 hours. Subsequently, 5-tribromomethyl sulfonyl-2-methyl thiadiazole 8g, 2-tribromomethyl sulfonyl benzothiazoleg [6] and 4, and 6-JITORI chloro methyl-2-phenyl triazine 5g, the disulfide compounds 2g and 1, 1-screw (2-hydroxy - 3, 5-dimethylphenyl) - It added stirring 3, 5, and 5 trimethyl hexane 160g, tetrachlorophthalic acid [5g and 1.1g] fluorochemical surfactant, and 2-butanone 590g and methyl-isobutyl-ketone 10g.
[0099] Like the above, it applied to the 175-micrometer polyethylene terephthalate base material (band-like flexibility base material) which carried out tint attachment of the prepared emulsion layer coating liquid with the blue color so that 2.3g /of silver might be set to 2 cm. And after spreading, after making it dry with the dryer (preceding paragraph side) condensed and collected and a draught drying means (latter-part side) in the case of an example, UV irradiation was carried out and heat developing sensitive material was obtained. On the other hand, after drying the spreading film only with a draught drying

type oven in the case of the example of a comparison, UV irradiation was carried out and heat developing sensitive material was obtained.
[0100] the front face of a product which manufactured by the approach of an example -- description was good. the front face of a product which manufactured by the approach of the example of a comparison on the other hand -- description became a poor receptacle about the effect of wind nonuniformity.
[0101] The example at the time of arranging the desiccation means which combined with the desiccation process of the production line of a [example 4] rebound ace court film the dryer (preceding paragraph side) condensed and collected and the draught drying means (latter-part side), and the example of a comparison at the time of arranging only the desiccation means draught drying type [conventional] were contrasted.
[0102] The rebound ace court coating liquid applied to a band-like flexibility base material was prepared as follows.
1) Each following reagent was blended with the container with which the preparation ceramic coat of inorganic particle dispersion liquid (M-1) was made with the following loadings, and mixed liquor was prepared.
[0103] - Cyclohexane -- 337g and phosphoric-acid radical content methacrylate (PM-2: Nippon Kayaku make) -- 31g and alumina (AKP-G015: the Sumitomo Chemical make, particle size of 15nm) -- Detailed distribution of the mixed liquor obtained 92g was carried out 1600 rpm in the sand mill (sand mill of 1/4G) for 10 hours. As media, 1400g of zirconia beads of 1mmphi was used. Zirconia beads were separated after distribution and the inorganic particle dispersion liquid (M-1) which carried out surface qualification were obtained.
[0104] 2) Methanol 97g, isopropanol 163g, and methyl-isobutyl-ketone 163g were added to 116g (M-1) of 43-% of the weight cyclohexane dispersion liquid of the alumina particle in which the coating liquid for activity energy-line hardening layers carried out preparation surface treatment. 200g (DPHA, Nippon Kayaku make) of mixture of dipentaerythritol pentaacrylate and dipentaerythritol hexaacrylate was added to this mixed liquor, and it dissolved in it. Furthermore, 7.5g (the IRUGA cure 184, Ciba-Geigy make) of photopolymerization initiators was added, and it dissolved. After stirring this mixture for 30 minutes, it filtered with the filter made from polypropylene of 1 micrometer of apertures, and the coating liquid for activity energy-line hardening layers was prepared.
[0105] 3) After carrying out glow discharge processing of the band-like flexibility base material (base material film), the coating liquid for activity energy-line hardening layers containing an alumina applied [desiccation thickness] with the wire bar spreading means so that it might be set to 8 micrometers. And after spreading, after making it dry with the dryer (preceding paragraph side) condensed and collected and a draught drying means (latter-part side) in the case of an example, UV irradiation was carried out and the hardening layer was obtained. On the other hand, after drying the spreading film only with a draught drying type oven in the case of the example of a comparison, UV irradiation was carried out and the hardening layer was obtained.
[0106] Next, the example at the time of arranging the desiccation means which combined with the desiccation process of the production line of a thick-film rebound ace court film the dryer (preceding paragraph side) condensed and collected and the draught drying means (latter-part side), and the example of a comparison at the time of arranging only

the desiccation means draught drying type [conventional] were contrasted.
[0107] The thick-film rebound ace court coating liquid applied to a band-like flexibility base material was prepared as follows.
[0108] 1) After stirring the preparation methyl-ethyl-ketone (MEK) 275m l. of a ring-opening-polymerization nature machine content compound (K-1) at 60 degrees C under a nitrogen air current for 1 hour, the polymerization initiator addition solution which carried out whole-quantity addition of what dissolved 0.5g (V-65: Wako Pure Chem make) of polymerization initiators in MEK8.3m l. was prepared. Then, glycidyl methacrylate 50g was dropped over 2 hours, the prepared polymerization initiator addition solution was added after dropping termination, and it was made to react for 2 hours. Then, it was made to react for 2 hours, having used reaction temperature as 80 degrees C, and was made to cool to a room temperature after reaction termination. It was dropped at them, having reaction covered [which was obtained] it over 10l. of hexanes for 1 hour, and reduced pressure drying of the 35 degrees C of the precipitate was carried out for 8 hours, and the ring-opening-polymerization nature machine content compound (K-1) was obtained.
[0109] 2) After dissolving the preparation trimethylolpropane triacrylate (ethylene nature partial saturation radical content compound) 75 section of a hardenability constituent, said ring-opening-polymerization nature machine content compound (K-1) 25 prepared section, a radical polymerization initiator (the IRUGA cure 184, Ciba-Geigy make), and a cationic initiator (UVI-6990: made in Union Carbide Japan) in the methyl isobutyl ketone / methyl-ethyl-ketone (1/5) mixed solution 40 section, it stirred for 30 minutes and the hardenability constituent was obtained. In addition, the polymerization initiator added the radical polymerization initiator and the cationic initiator by a unit of 2.9% of the weight to the gross mass of an ethylene nature partial saturation radical content compound and a ring-opening-polymerization nature machine content compound.
[0110] 3) As a transparent band-like flexibility base material (transparence base material film), after carrying out glow discharge processing of the polyethylene terephthalate film with a thickness of 188 micrometers, the hardenability constituent which carried out [above-mentioned] preparation was applied by the method of application of an extrusion die. And after spreading, after making it dry with the dryer (preceding paragraph side) condensed and collected and a draught drying means (latter-part side) in the case of an example, UV irradiation was carried out and the thick-film rebound ace court film was obtained by heating at 120 more degrees C for 10 minutes. On the other hand, after drying the spreading film only with a draught drying type oven in the case of the example of a comparison, UV irradiation was carried out and the thick-film rebound ace court film was obtained by heating at 120 more degrees C for 10 minutes. In addition, at 120 degrees C, desiccation is 2 minutes and UV irradiation is 750 mj/cm2. It carried out on conditions.
[0111] the front face of a product which manufactured by the approach of an example -- description was good. the front face of a product which manufactured by the approach of the example of a comparison on the other hand -- description produced the thickness nonuniformity considered to be the effect of wind nonuniformity, and became a defect.
[0112]
[Effect of the Invention] According to the desiccation approach of the spreading film of this invention, and equipment, the desiccation nonuniformity generated immediately after

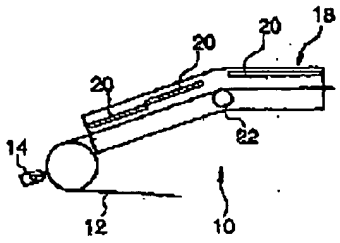
spreading in a double width spreading film surface in the long picture which applied and formed various liquefied constituents in the band-like flexibility base material which carries out continuation transit is controlled, and the spreading film can be efficiently dried to homogeneity.

[0113] Moreover, without changing the layout of spreading and a desiccation process greatly, since it is restrained by neither the physical properties of coating liquid, nor the class of solvent, the flexible design of a coating liquid formula means is still more possible. Moreover, there is effectiveness also in energy saving and a cost cut.

[0114] Furthermore, the structure of the network of the macromolecule in the spreading film which can prevent floating in the spreading film and is formed during desiccation, and a particle can be formed in homogeneity dramatically finely.

[Translation done.]

【図1】



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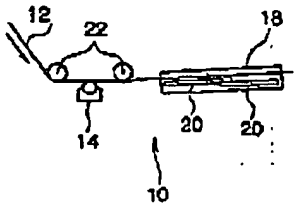

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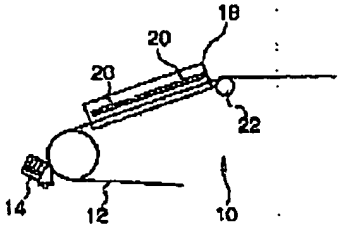

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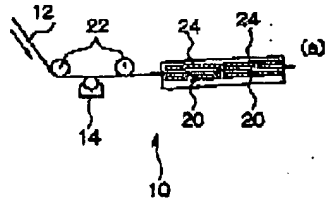

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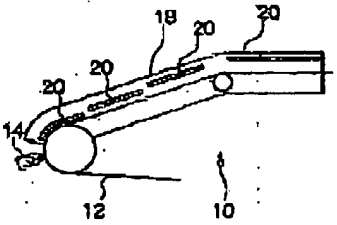

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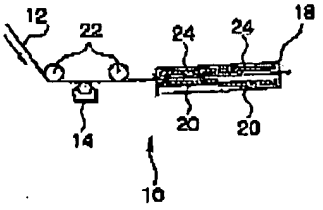

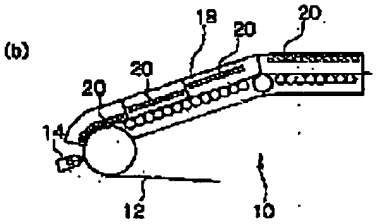

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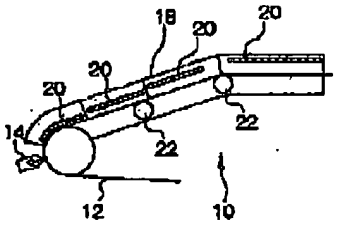

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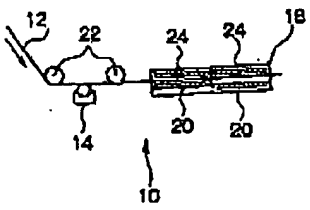
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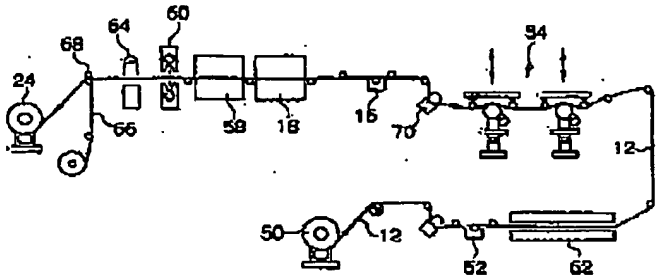
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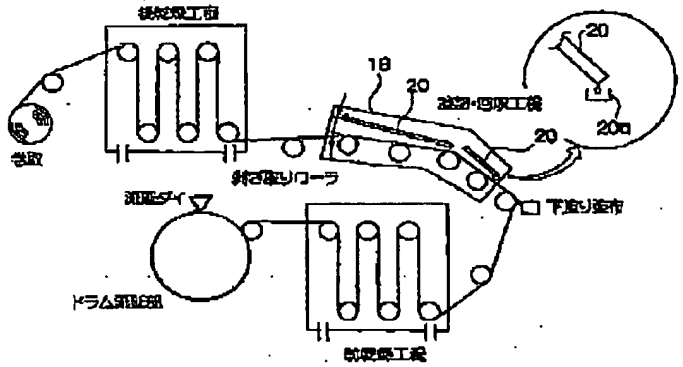
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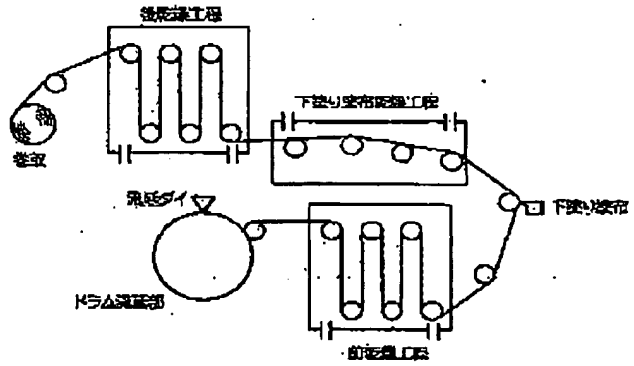
20
20
20a
20
下塗り塗布
ドラム回転部

【図11】


下塗り塗布
ドラム回転部